The effect of Zeolite A administration on intestinal calcium absorption, blood mineral concentration and calcium excretion in urin of goat kids

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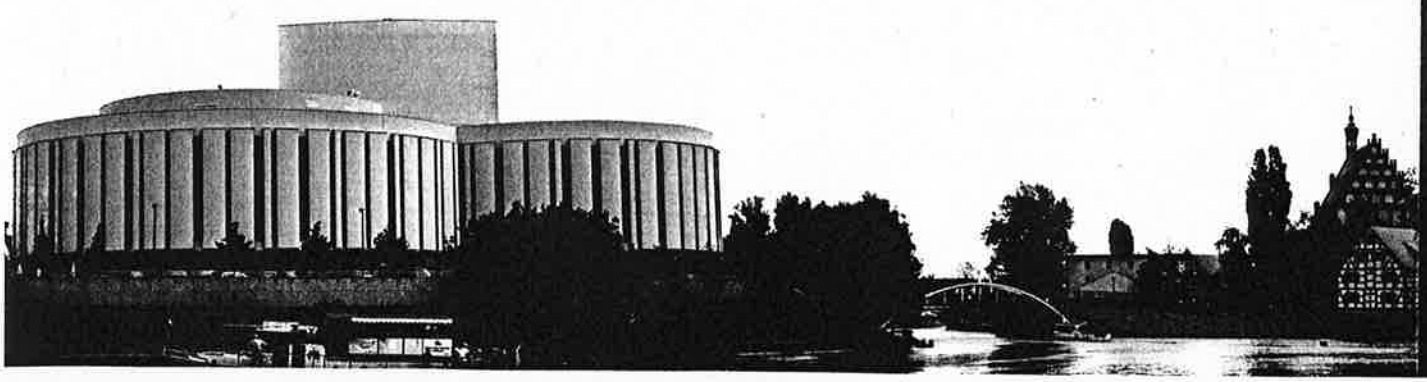

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The effect of Zeolite A administration on intestinal calcium absorption, blood mineral concentration and calcium excretion in urine of goat kids

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Introduction: Several studies on the efficacy of Zeolite A in prevention of parturient paresis in dairy cows exist (1, 2). In these studies, it was shown that Zeolite A supplementation causes a stabilized blood calcium (Ca) level around parturition. However there is no knowledge on the physiological mechanisms associated with Zeolite A. The aim of this study was to investigate whether Zeolite A has an influence on the active absorption of Ca in the intestine, the mineral status of the animals and the Ca excretion in urine.

Animals, material and methods: For this purpose, 17 goat kids (Saanen breed, 11 weeks of age) were allocated to one of three groups (one control and two treatment groups) and kept in group pens on wood shavings. All animals received hay (2nd cut) and concentrate in single boxes over three weeks. The concentrate of the treatment groups was supplemented with 1.2 g/kg body weight (Zl) respectively 1.6 g/kg body weight (Zh) Zeolite A. Blood and urine samples were periodically taken during the trial. After three weeks the animals were slaughtered and samples from intestine and kidney were collected.

Blood samples were examined for Ca, phosphorus (P) and $1,25(OH)_2D_3$ and urine samples for Ca and P. The samples from intestine and kidney were analysed for genes coding for proteins which are involved in active Ca absorption in intestine and reabsorption in kidney (Transient receptor potential vanilloid (TRPV) and plasma membrane calcium ATPase (PMCA)) with PCR. For statistical evaluation multivariate analysis of variance for repeated measurements (MANOVA) was performed with group as a cofactor.

Results and discussion: There was no difference between the groups for Ca concentrations in serum. P and $1,25(OH)_2D_3$ concentrations in serum were significantly decreased in both treatment groups.

TRPV and PMCA in intestine were not significantly different between all groups. However, in kidney TRPV was significantly higher in treatment groups compared to the control group. Nevertheless Ca excretion tended to be higher in treatment groups. It is described for humans, that hypophosphatemia can increase urinary excretion of Ca due to an increase in $1,25(OH)_2D_3$ and therefore an increase in active Ca absorption (3). In agreement with this, in Zeolite treated cows an elevated Ca excretion in urine was observed. These authors purposed an involvement of $1,25(OH)_2D_3$ (2). In contrast, in our study neither intestinal active absorption nor increased $1,25(OH)_2D_3$ levels in serum could be shown. However, an unknown active mechanism in rumen (4), which seems to be independent of $1,25(OH)_2D_3$ (5), might play an important role on the effect of Zeolite.

Conclusion: Zeolite A supplementation in goat kids caused no alteration in blood Ca levels, but led to hypophosphatemia and an unexpected not yet understand decrease in $1,25(OH)_2D_3$ level. There is a need in further investigations on the long-term action of Zeolite especially in relation to active Ca absorption in rumen.

References:

1) T. Thilsing-Hansen, R.J. Jørgensen, J.M.D. Enemark (2002): J Dairy Sci 85: 1855-1862
2) H. Grabherr, M. Spolders, M. Fürll, G. Flachowsky (2008): J Anim Physiol Anim Nutr 93: 221-236
3) H.W. Bleich, M.J. Moore (1979): NEJM 301: 535-541
4) K. Sidler-Lauff, A. Boos, M. Kraenzlin, A. Liesegang (2010): J Anim Sci 88: 3598-3610
5) B. Schröder, W. Goebel, K. Huber, G. Breves (2001): J Vet Med 48: 353-363